tried by students attending the lectures at the Finsbury Technical College, who, as is stated in the preface, written by Prof. John Perry, have worked through them and obtained "a real good working knowledge of the application of the principles of mechanics and machine design; . . . their knowledge was always ready for use."

The examples, as a rule, are thoroughly practical, and may be taken as illustrating Prof. J. Perry's book on "Practical Mechanics," and Prof. Unwin's book on "Machine Design."

To make the volume more complete, useful rules and constants, together with tables of sines, cosines, tangents, and cotangents, of angles from 1° to 45°, are added, concluding with a table of the squares, cubes, square roots, cube roots, and reciprocals of all numbers from 1 to 100, and of approximate fifth roots from 1 to 1000.

A Text-book of Physiology. By M. Foster, F.R.S· Fifth Edition. Part I. comprising Book I. (London: Macmillan and Co., 1888.)

THIS work was originally published in 1876, and it has become so widely known that we need not now do much more than note the appearance of the first instalment of a new edition. In this edition—the fifth—considerable changes and additions have been made. The changes, however, do not affect the character of the book; and Prof. Foster explains that the additions, with the exception of the histological paragraphs, are caused, not by any attempt to add new matter or to enlarge the general scope of the work, but by an effort to explain more fully and at greater length what seem to him to be the most fundamental and most important topics. He has introduced some histological statements, not with the view of in any way relieving the student from the necessity of studying distinct histological treatises, but in order to bring him to the physiological problem with the histological data fresh in his mind. Hence in dealing with the several histological points the author has confined himself to matters having a physiological bearing. This first part will be followed as soon as possible by the second and third parts.

The Analyst's Laboratory Companion. By Alfred E. Johnson. (London: J. and A. Churchill, 1888.)

DURING the past four years, Mr. Johnson has had in everyday use in the laboratory a manuscript book of factors and tables. The work grew by constant additions, made as required; and in the end, as he explains in the preface, it became complete enough to encourage him in the belief that it might prove useful to analysts generally. Accordingly he has issued the present little volume, and no doubt he is right in thinking that the large amount of labour involved in the calculation of the many original tables here published may be found to save much of the time otherwise required by the analyst in working out the results of analysis. For the convenience of students not well acquainted with logarithms, of which he has made free use, he has given an account of them, adding examples fully worked out and chosen so as to include and explain the difficulties generally felt in connection with this subject.

LETTERS TO THE EDITOR.

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of* NATURE. *No notice is taken of anonymous communications.*]

Prophetic Germs.

I REGRET to find that I put an erroneous interpretation upon the phrase "non-significant organs," as used by Prof. Ray Lankester. I never doubted that it meant organs or structures which were non-significant in respect to actual use; that, in short, it was his phrase for what other men have variously called aborted or rudimentary organs. He now explains that "non-significant," in his terminology, means any variation from hereditary forms which is fortuitous—as unknown in respect to its origin as it is in respect to its actual or future use. Although I see no value in this phrase as descriptive of anything that exists, I see great value in Prof. Ray Lankester's admission that natural selection cannot act upon any structure which is not already developed up to the stage of actual use. This is really all I want for my previous argument, because all organs whatever do actually pass through rudimentary stages in which actual use is impossible. In no possible case, therefore, can selection explain the origin of any organic structure. I rejoice to find Prof. Ray Lankester denouncing as "an absurdity" the idea that "congenital variations are selected when they are not of any actual use." It must therefore be quite according to the admitted constitution and course of Nature that we should find organs "on the rise," as well as organs "on the wane." All germs must be prophetic of their future use, so long as they are in germinal stages; and, if evolution be true, the world ought always to have been full of them, and ought to be full of them now, unless the creative or evolutionary work has been arrested, at least locally, and for a time.

ARGYLL.

Inveraray, Argyllshire, October 8.

The Geometric Interpretation of Monge's Differential Equation to all Conics.

WITH reference to the remarks of "R. B. H." (NATURE, June 28, p. 197) on my interpretation of the differential equation to all conics, I wish to point out that the objections he seems to take do not appear to be well founded. The difficulty he finds is that the geometrical interpretation given amounts to the fact that "a conic is a conic." But it is easy to see that there is no peculiarity in this; it arises simply from the well-known fact that all the geometrical properties of any given figure are inter-dependent: one of them being given, the others may be deduced as legitimate consequences from it. "R. B. H." takes the proposition which constitutes my interpretation, and then, coupling it with the other theorem that the osculating conic of any conic is the given conic, comes to the conclusion that a conic is a conic, and, apparently, he takes it to be very strange; but, as a matter of fact, given *any two* properties of a conic (or of any other curve), we can only come to the conclusion that the conic is a conic (or that the given curve is what it professes to be). Take, for example, the geometric interpretation of the differential equation of all right lines, which is $q = 0$; it simply means that the curvature vanishes at every point of every right line, which is equivalent to the fact that a straight line is not curved, or that a straight line is a straight line. There is certainly nothing strange in this: it is the legitimate effect of the process employed. Would "R. B. H.," on this ground, reject the geometrical interpretation of the differential equation of all straight lines? Surely the process is nothing but a piece of quite unobjectionable verification. Similarly, the differential equation of all circles, $(1 + p^2)r - 3pq^2 = 0$, means that the angle of aberrancy vanishes at every point of every circle. Combining this with the self-evident proposition that the normal and the axis of aberrancy coincide in the case of a circle, we may come to the conclusion that a circle is a circle; but I submit that this is really a verification, and surely no ground for rejecting the interpretation. Indeed, the question whether such processes are to be regarded as verifications or not seems to me to be much the same question whether every syllogism is a *petitio principii* or not. But as I have elsewhere, in the papers referred to in my last letter (p. 173, *ante*), fully discussed what a geometrical interpretation properly ought to be, I need not enlarge further on this point.

As to the difficulty which "R. B. H." feels in drawing a curve at every point of which the radius of curvature vanishes, I may remark that this is a "limiting case," and the matter becomes clear when my interpretation is paraphrased thus: "If the radius of curvature of the aberrancy curve of a given curve vanishes at every point, that curve degenerates into a conic."

Finally, I fail to see why an interpretation is to be rejected simply because the property it enunciates happens to admit of an easy verification. The conic has an infinite number of properties, and the chief difficulty in discovering the geometrical interpretation of its differential equation has been to find out which

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of these numerous properties is adequately and most appropriately represented by the Mongian equation. The question has been, what fact in the history of the conic, if I may say so, is most intimately associated with the vanishing of the Mongian; and that fact, I believe, is given in my interpretation. Whether the fact admits of an easy verification or not seems to me to be wholly foreign to the question.

Calcutta, July 27. ASUTOSH MUKHOPADHYAY.

Upper and Lower Wind Currents over the Torrid Zone.

AFTER my arrival in China in 1883, I made inquiries, among persons who had kept meteorological registers, concerning the direction from which clouds usually come here, but was told that they came from all directions without any apparent order. But the observations made during January 1884, printed in the Weather Report published on February 11, showed at once clearly that the lower clouds came from the east, and that the directions veered with increasing height, the highest clouds coming from the west, as explained in the text of the Annual Weather Report published on February 17, 1885. This might have been expected in analogy with what obtains in cyclones, as the trade-wind blows into the calm belt as if this were the centre of a depression drawn out to extend round the whole earth near the equator.

The Hon. R. Abercromby, to whom my Reports were sent without delay, convinced himself of the truth of those remarks during a tour round the world, and addressed a letter to NATURE on the subject on October 26, 1885, but it is of importance that the subject should be investigated at fixed observatories within the tropics, where hardly enough attention has hitherto been paid to the movements of clouds, to judge from what has hitherto been published.

In the Annual Weather Report for 1885, it is stated that, from June to September inclusive, cirri come from two different directions—from about north-east while a typhoon is in existence somewhere, their direction often backing from about east to north while the centre of the typhoon is yet over 700 miles away; and from about west when there are no signs of a typhoon. But cirri are rarely seen in summer except before typhoons, through whose agency vapour is evidently carried up to the higher regions of the atmosphere. It is, however, to be expected that the existence of the southerly monsoon (caused by the low barometer in the northern part of the Chinese Empire) during the summer to some extent influences the movements of the clouds.

The following table exhibits from four years' observations (1884 to 1887 inclusive) the average directions from which the wind comes at the Observatory, about 150 feet above M.S.L., and at the Peak about 1850 feet above M.S.L., as well as the average directions from which the upper and lower clouds come, but the difference between the latter is so great that intermediate directions will be missed:—

Month.	Obs.	Peak.	Lower C.	Upper C.
January	E 11° N	E 10° N	E by S	W by S
February	E 15 N	E 17 N	E by N	W
March	E 4 N	E 17 S	ESE	W by S
April	E 3 N	E 30 S	SE	W by S
May	E 11 S	E 44 S	SSE	WNW
June	E 51 S	E 67 S	S by E	NNW
July	E 46 S	E 87 S	S by E	NE
August	E 72 S	S	S	NE
September	E 12 N	E 1 N	ESE	NNE
October	E 15 N	E 8 N	E by N	W by S
November	E 28 N	E 19 N	ENE	W by S
December	E 26 N	E 18 N	E by N	WSW
Mean	E 6 S	E 22 S	E 30° S	W 33° N

If an observer outside the earth were to determine the period of this planet's rotation by observing spots formed by clouds, he would obtain different values according to the level of the respective cloud-layer, just as we obtain different values for the period of rotation of Jupiter from observations of different classes of spots. In the case of the earth, the observation of the highest clouds near the equator might possibly furnish a value of the period too short by a tenth, and there is no doubt it would be different nearer the Poles. W. DOBERCK.

Hong Kong Observatory, August 11.

The Natural History of the Roman Numerals.

SOME time ago I had the pleasure of reading in your journal (vol. xxxvi. p. 555) an interesting article by Mr. Lymburn on the above subject. In this the writer shows the probable evolution of the X ten, from the V hand, and thence the broad arrow, ↑. As the Scandinavians used this arrow sign, calling it *tir* or *tyr*, as an equivalent for T in the Runes (see Taylor, "The Alphabet," vol. ii., p. 18), it is therefore connected with the Greek *tau*, the headless cross, the X of the Semitic languages. I have no doubt that many of your readers take an interest in anything bearing on this subject. This is my apology for calling their attention to an article published in the last volume of Transactions of the New Zealand Institute,[1] wherein I break new ground by showing that the word *tau* was known in Polynesia as a cross, as ten, and probably as meaning "writing."

I have given, in the different dialects of New Zealand, Samoa, Tonga, Hawaii, &c., the meanings of the word, and shown its entry into other compound words. A brief *précis* runs as follows:—

Tatau (*ta-tau*) is the Tahitian word which Cook brought to us, and is better rendered by his spelling *tattow* than by our English *tattoo*. In Maori, *tatau* means to count, to repeat one by one; but in Hawaiian it means to write, to make letters upon, to print as upon *tapa* (native cloth) as in former times. In this Hawaiian, *tau* means to dot, to fix the boundaries of a land or country, to give publicity to a thing. In Tahitian, *tatau* means not only to tattoo, but to count, number; in Samoan, *tau* is to count, and in Marquesan, *tatau* to reckon. In composition, too, it enters into many words, such as teacher, pupil, genealogy, &c., and it seems impossible but that the tattooing (at one time done in "three-marks" and arrow-heads) meant some kind of character or script.

As to the numeral "ten," I bring some interesting evidence which I cannot condense.

As to the figure of the cross being used as a sacred sign, there are innumerable evidences to that effect in the Polynesian islands; notably that the Southern Cross is called in Tahitian *tau-ha* ("four-cross"), and that the cross X was the taboo sign in front of Hawaiian temples. I have since learnt that in the Solomon Islands the cross taboos anything to the chief.

Wellington, N.Z., August 5. EDW. TREGEAR.

Indian Life Statistics.

THOUGH several weeks have now elapsed since Dr. Hyde Clarke's inquiry about the effects of lucky and unlucky times and seasons upon the Indian birth-rate was published (in NATURE of July 26, p. 297), none of your readers in England who happen to be acquainted with India have come forward to answer it. I therefore write to point out that, though the times of Hindu *marriages* are to a very great extent controlled by supposed lucky or unlucky days, months, or years, these have nothing whatever to do with variations in the birth-rate, for the usual age of marriage of girls is from eight to ten years, and child-bearing at the earliest does not commence before twelve or thirteen.

With regard to the *Holi* and other religious festivals, I have it on the authority of Mr. J. C. Nesfield, Inspector of Schools in Oudh, who has made a life-long study of Hindu castes and their customs, that, whatever the origin and primary significance of the *Holi* may have been, it is not now connected in any special manner with the multiplication of the species. The religious ceremony to which the Hindu looks for the furtherance of his desire for offspring is the *Durga Pujah*, or worship of the consort of *Shiva*, which is the occasion of the annual family reunion all over Bengal. In the Upper Provinces a totally different festival is celebrated at the same time of the year—the *Rām Lila*, a sort of dramatic performance or mystery-play, commemorating the expedition of Rāma to Ceylon for the recovery of his lost wife; but Mr. Nesfield says that during the *Rām Lila* some member of every family is specially set apart to conduct a ceremonial worship of *Kāli*, or *Durga*, ending with the sacrifice of a male kid, and that the object of this ceremony is to obtain the favour of *Kāli* and her consort for the continu-

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[1] Trans. N.Z. Inst., vol. xx., "Ancient Alphabets in Polynesia," by E Tregear, F.R.G.S. (London: Trübner and Co.)

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